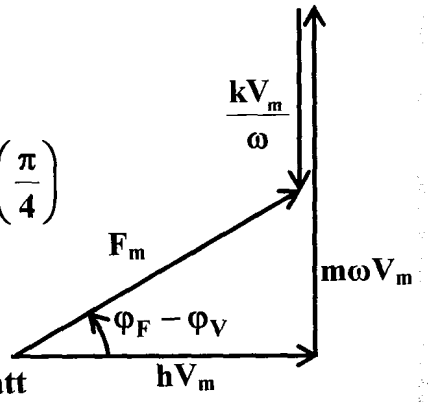
b- $tg(\varphi_F - \varphi_v) = \dfrac{m\omega - \dfrac{k}{\omega}}{h}$

$\cos(\varphi_F - \varphi_v) = \dfrac{hV_m}{F_m} \Rightarrow h = \dfrac{F_m}{V_m}\cos\left(\dfrac{\pi}{4}\right)$

$h = \dfrac{2}{1}\dfrac{\sqrt{2}}{2} = \sqrt{2}\,kg.s^{-1}$



c- $P = \dfrac{hV_m^2}{2} = \dfrac{\sqrt{2}.(1)^2}{2} = \dfrac{\sqrt{2}}{2}$ watt

2°) V_m est maximale $\Rightarrow$Résonance de vitesse

$\Rightarrow \omega_1 = \omega_0 = \sqrt{\dfrac{k}{m}} \Rightarrow \omega_0^2 = \dfrac{k}{m}$ or pour $\omega = 12 rad.s^{-1}$

$tg(\varphi_F - \varphi_v) = \dfrac{m\omega - \dfrac{k}{\omega}}{h} = tg\left(\dfrac{\pi}{4}\right) = 1$

$m\omega - \dfrac{k}{\omega} = h$ et $\omega_0^2 = \dfrac{k}{m} \Rightarrow m = \dfrac{k}{\omega_0^2}$

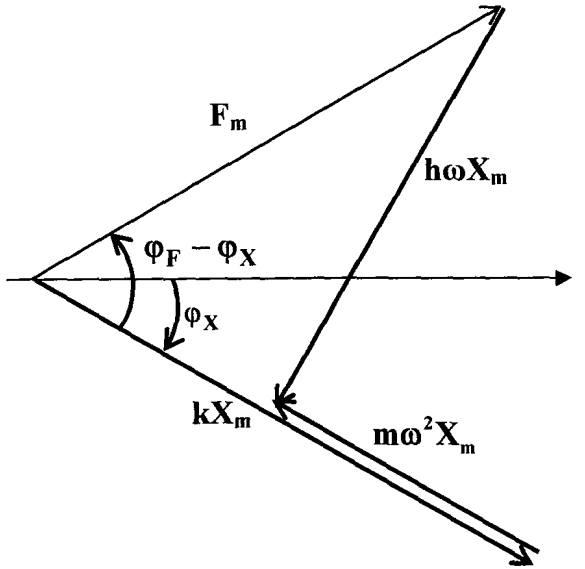
$k\left(\dfrac{\omega}{\omega_0^2} - \dfrac{1}{\omega}\right) = h \Rightarrow k = \dfrac{h}{\dfrac{\omega}{\omega_0^2} - \dfrac{1}{\omega}}$

$k = \dfrac{\sqrt{2}}{\dfrac{12}{100} - \dfrac{1}{12}} = 38,5 Nm^{-1}$

$m = \dfrac{k}{\omega_0^2} = \dfrac{38,5}{100} = 0,385 kg$

II- Diagramme de Fresnel :

1°) Echelle 1cm $\rightarrow$ 1N



* $kX_m \rightarrow 7,5cm$ donc $kX_m = 7,5N$

* $m\omega_2^2 X_m \rightarrow 4cm \Rightarrow m\omega_2^2 X_m = 4N$

$\omega_2 = \sqrt{\dfrac{4}{4010^{-3}.0,15}} = 25,8 rad.s^{-1}$

* $h_2\omega_2 X_m \rightarrow 6cm \Rightarrow h_2\omega_2 X_m = 6N$

$h_2 = \dfrac{6}{25,8x0,15} = 1,55 kg.s^{-1}$